

Parental Role in Mathematics Achievement of Visually Impaired Students in Benue State

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Abstract

The impact of parental role on students' achievement has received a significant amount of research attention in the general, but surprisingly, very little research has been conducted in this area for students with disabilities. This study investigated the relationship between parental role (both at home and school) and Mathematics achievement for students with visual impairments. The samples used for the study ($N = 215$ and $N = 153$) were taken from St. Francis Special Schools for the Deaf and Dumb, Vandeikya and Otukpo respectively. Multilevel modelling was used to investigate the research questions. Parental role at school was positively associated with Mathematics achievement for students who began the study in primary school, and parental role at home was negatively associated with Mathematics achievement for students without a cognitive disability. Thus, there was a strong positive association between Mathematics achievement and parental role at home for students who also had a cognitive disability.

Keywords: *parental role, visual impairments, Mathematics achievement, student*

1. Introduction

Low-vision and blindness stakeholders (like parents, educators, consumers) have long been concerned about the apparent Mathematics achievement gap between students who are visually impaired (i.e., those who have low-vision or are blind) and their sighted peers. Also, specialized teachers of students with visual impairments (VI) have consistently expressed concerns about their ability to provide students quality instruction in the Braille Mathematics code (DeMario, Lang & Lian, 1998; Henderson & Mapp, 2002; Rosenblum & Amato, 2004).

In Nigeria, data on accountability tests are not even available. Even in the United States (US), these data are limited, available information does show that students with VI score lower than nondisabled students. For example, Winford (2003) found that students with a VI but no secondary disabilities performed below their sighted peers on a state-wide assessment of Mathematics. The North Carolina State Board of Education is one of the few states that report student assessment data disaggregated by federally defined disability categories. In the 2007–2008 school year, 56% of students with a primary disability of VI or blindness in third through eighth grade scored at or above grade level in Mathematics, compared to 74% of students without disabilities.

One factor that is thought to have a positive impact on school achievement, including Mathematics achievement, for the general population is parental role. In fact, it is considered to be

so important to educational achievement that one of the six targeted areas for reform of the No Child Left Behind Act of 2001 (2002) in US is increasing parental role. Educational reforms in several states of US also include efforts to increase parental role (Pomerantz, Moorman & Litwack, 2007). Parental role has received a considerable amount of research attention, which for the most part has supported its importance. However, despite the considerable attention parental role has received among the general population of students, a surprisingly limited amount of research has been conducted with students with disabilities or students in special education. In fact, no published research on the effects of parental role on achievement of students with VI is found.

2. Literature Review

Parental role can be defined in several ways. For the purpose of this article, parental role is differentiated by where it occurs: either in school or outside of school, which is referred to as "at home." Parental role at school (PRS) involves activities that require contact with the school and can include such things as meeting with a teacher or administrator, attending general school meetings, attending school events, and volunteering at the school. Parental role at home (PRH) can include such things as assistance with homework, talking to the child about school experiences, reading the newspaper or other material to the child, and taking the child to the library or a museum.

3. PRH

A recent systematic review of PRH concluded that parental role has a positive and significant effect on children's overall academic achievement (Nye, Turner & Schwartz, 2006). This review included only experimental studies that used a randomized controlled design (i.e., interventions meant to increase parental role, with one group serving as a control to the experimental group). The 18 studies resulted in an overall average effect size of $d = 0.45$, which was considered important in practical terms. Of the 18 studies, 5 specifically investigated Mathematics achievement; the average effect size in this area was $d = 0.54$. Although this effect was large, it was not very precise because one of those studies reported an extremely large effect size ($d = 1.50$).

The association between parental role and student achievement has also been investigated by measuring the amount of naturally occurring parental role (according to the parent, the child or a teacher) and evaluating its relationship to achievement. This research has involved both cross-sectional and longitudinal studies. Findings from this type of research are less clear as to the benefits of parental role. Some of the research has supported the positive effects of PRH on student achievement, particularly for activities that are not directly related to school but rather to general academic enrichment. Findings on the effects of parental role in activities that are directly related to school have been mixed, with some results indicating a negative relationship between involvement and achievement (Pomerantz, Moorman & Litwack, 2007; Salman, 2009).

4. PRS

Findings on the positive benefits of involvement at school have been more consistent. A report from the U.S. Department of Education documented that a high percentage of parents participate in school activities, such as attending a general school meeting (89%), attending a parent-teacher conference (78%), attending a school event (74%), and volunteering at school (46%) (Herrold & O'Donnell, 2008). These percentages are highest when students are in primary school and decrease as students advance to higher grades. Both cross-sectional and longitudinal research has documented an association between naturally occurring parental role in school and higher achievement (Fan & Chen, 2001; Hill & Tyson, 2009; Pomerantz, Moorman & Litwack, 2007). This involvement in early grades has been shown to predict later achievement—even achievement in secondary school (e.g., Barnard, 2004; Izzo, Weissberg, Kasprow, & Fendrich, 1999). However,

intervention research meant to promote parental role in school activities has not provided as much support for its benefit to achievement as the correlational research has (Pomerantz, Moorman & Litwack, 2007).

5. The Mechanisms by which Parental Role influences Achievement

Explanations for why and how parental role influences achievement have been proposed by several authors. Hill and Taylor (2004) suggested two mechanisms for this relationship: *increasing social capital* and *social control*. Parental role—such as through their interactions with school personnel—is thought to increase parents' skills and information (social capital), making them better prepared to assist their children with school-related activities. Social control occurs when parents and schools work together to provide the same message to children about appropriate behaviour. If this message is the same across both settings, it is expected to reduce problem behaviours.

Pomerantz, Moorman & Litwack (2007) described two sets of models by which parental role can effect achievement: *skill development models* and *motivational development models*. Skill development models suggest that parents' involvement in school activities provides children with skill-related resources such as cognitive skills and meta-cognitive skills. Motivational development models suggest that parental role benefits children's achievement because it provides them with a number of motivational resources that encourage their engagement in school. In general, the idea is that parental role can have a direct effect on achievement by improving children's skills (like helping them to do homework) or an indirect effect by increasing motivation for school or improving student behaviour.

6. Differential Effects of Parental role by Grade Level

Parental role tends to decrease as children get older, and the majority of parental role research has focused on primary school-age children. However, the effects of parental role at different grade levels have been the subject of more recent research. Some of this research involving post primary and secondary school students has documented little or no relationship between parental role and achievement for these students (Fan, 2001; Bronstein, Ginsberg, & Herrera, 2005), whereas other studies have found a positive relationship between parental role and adolescents' achievement (Grolnick, Kurowski, Dunlap, & Hevey, 2000; Hill, Castellino, Lansford, Nowlin, Dodge, Bates & Pettit, 2004).

7. Research involving Students with Disabilities

Research concerning parental role of students with disabilities is surprisingly limited, particularly given the fact that parental role is obviously considered important for this population. Much of the research that has been conducted in this area has been descriptive in nature, measuring levels of parental role for various subgroups of students with disabilities, or has involved a comparison of the levels of parental role of students in the general population and special education students. A few research studies have documented similar levels of involvement for parents of students with disabilities and parents of students without disabilities (Gerstein, 2006; McKinney & Hocutt, 1982; Yanok & Derubertis, 1989), but two studies found general education students to have higher levels of parental role in certain areas (Deslandes, Royer, Potvin, & Leclerc, 1999; Rogers, Wiener, Marton, & Tannock, 2009).

Although no published research relating parental role to achievement for students with disabilities could be found, two unpublished dissertations that addressed this topic were located in US. One of these studies investigated the relationship between parental role and achievement for students with learning disabilities and serious emotional disturbances (Woika, 1993). Parental role was measured by school-initiated home–school contact, parent-initiated home–school contact, and

other involvement such as parent–teacher organizations and volunteer activities. Results indicated that the three parent-involvement factors combined were a significant predictor of achievement but that both types of home– school contact tended to be associated with lower achievement whereas other involvement tended to be associated with higher achievement. A more recent study also evaluated the benefits of parental role for a group of students with learning disabilities, including its relationship with grades (Gerstein, 2006). Results indicated that higher grades were correlated with both parents' involvement, particularly school-related involvement for mothers and fathers' involvement in personal activities.

8. The Current Study

Given the documented disparity in Mathematics achievement for youth with VI, it is important to consider alterable factors that could result in improved Mathematics achievement for this population. One such factor is parental role, yet the relationship between parental role and achievement for youth with VI has not been studied. It is possible that the relationship for this population may differ from the relationship exhibited in the general population. Parental role may not be capable of affecting the difficulties students with VI face with Mathematics. For example, if difficulty seeing the board and difficulty following along during class cause decreased performance, PRH may not be able to compensate for these problems. On the other hand, PRS may assist the student in receiving the assistive technology and supports he or she needs to succeed (Kelly, 2009) and might exhibit a stronger relationship with achievement. Achievement levels tend to be lower for students with cognitive impairments, and parental role may not have the same effect for them. Therefore, we also thought it important to consider whether this relationship differs based on the presence of a cognitive impairment or grade level (as documented in other research).

The following research questions were investigated in the current study:

1. Is PRS associated with Mathematics achievement for youth with VI in primary and junior school?
2. Is PRH associated with Mathematics achievement for youth with VI in primary and junior school?
3. Does the effect of parental role (at home or at school) on achievement differ based on (a) grade level or (b) the presence of a cognitive disability for youth with VI?

9. Method

9.1 Data Source

The database used to investigate our research questions was the SEELS. A two-stage process was used to identify the sample. First, a stratified sample from St. Francis Schools for the Deaf and Dumb Vandeikya and Otukpo for students with disabilities was identified. Next, students were randomly selected for participation from these special schools.

SEELS is a comprehensive study, documenting the achievement, personal characteristics, and educational experiences of a sample of primary school students as they move through the school system, up to secondary school. Data collection from several sources (i.e., parents, teachers and school administrators) occurred up to three times for each student. This data collection occurred in three waves, during 2008–2009, 2010, and 2011. Data were collected about the students' family characteristics and nonschool activities, classroom experiences, instructional goals, accommodations, and school programs, policies and practices. Students were directly assessed on achievement, self-concept and attitudes toward school.

9.2 Sample

The population of interest to this study was students with VI. These students were identified by having VI designated as their primary disability by the school. VI is one of the 13 Special Education disability categories and is defined as "an impairment in vision that, even with correction, adversely affects a child's educational performance" (Department of Education, 2006). All students with a primary disability of VI who had scores available on the Calculations subtest of the *Woodcock-Johnson III Tests of Achievement* (WJ-III ACH) and parental role data (for at least one of the two variables) were included in the sample ($N = 215$). Several of these students had a cognitive disability in addition to their VI ($n = 21$).

9.3 Variables

Dependent Variable. The Calculations subtest of the WJ-III ACH measures Mathematics computational skills, ranging in difficulty from simple to advanced. The easiest problems require the student to perform single-digit addition, whereas the most difficult involve calculus (Blackorby, Chorost, Garza, & Guzman, 2004). This is a written test. The W scores available in the WJ-III ACH are Raschscaled scores that have the quality of equal interval units. They are centered on a value of 500, which has been set to approximate the average performance of students beginning the primary five (Woodcock, McGrew, & Mather, 2001). Because of its fixed setting to primary five student performance, the W score is ideal for use in longitudinal analyses.

The WJ-III ACH is a well-developed and thoroughly evaluated instrument. Reviewers in the *Fifteenth Mental Measurements Yearbook* gave it the highest praise, both considering it the best available instrument to measure achievement (Cizek, 2003; Sandoval, 2003). It was developed based on the Cattell-Horn-Carroll theory of cognitive abilities and educational core curricular areas and domains. The WJ-III ACH exhibits good to excellent reliability; the reported split-half reliability coefficients for the two tests are .86 and .93, respectively.

It is based on several sources of empirically sound validity evidence. Construct validity has been supported with confirmatory factor analytic models, whereas concurrent validity is supported by the test's correlations with other established achievement tests, such as the *Wechsler Individual Achievement Test* and the *Kaufman Test of Educational Achievement* (Schrack, McGrew, & Woodcock, 2001).

Independent Variables. PRS was a scale available in the SEELS database that consisted of three items measuring the frequency of parent attendance at the school for the following reasons: (a) a general school meeting, (b) a school or class event, and (c) volunteered at school. Responses were on a 5-point scale from *none* to *more than 6 times*, with scores ranging from 0 to 4. Total scores ranged from 0 to 12, with higher scores indicating a greater amount of involvement at school. A score of 0 would indicate that the parents never attended their child's school for any of these reasons, and a score of 12 would indicate that the parents attended the school more than 6 times for *each* of these reasons.

Prior to entering this variable in the model, it was centred around its approximate mean of 4. This variable was modelled as time variant, meaning that its value could change at each wave. PRS and Mathematics achievement data were available for 215 students. The total number of observations used in the analyses was 642, with these number of observations available per person: 120 had one observation, 141 had two observations, and 80 had all three observations.

PRH was a scale available in the SEELS database that consisted of three items measuring the frequency of parental interaction with the child in the following areas: (a) spoke with about experiences in school, (b) helped with homework, and (c) read to. Responses were on a scale from *not at all*, assigned a value of 1, to *every day*, assigned a value of 4. Total scores ranged from 3 to 12, with higher scores indicating a greater amount of involvement at home. Therefore, a score of 3 indicates no parental role in these areas and a score of 12 indicates everyday involvement in all

three areas. Prior to entering this variable in the model, it was centered around its approximate mean of 9. This variable was modelled as time variant, meaning that its value could change at each wave. A total of 324 students had PRH and Mathematics achievement data available. (Note that this sample represents a subset of the 341 students available for the PRS analyses.) The total number of observations used in the analyses was 595, with the following number of observations available per person: 125 had one observation, 127 had two observations, and 72 had all three observations.

Control Variables. Several variables that are known to be related to Mathematics achievement, and possibly to parental role, were included in the models to control for their effects. The control variables included in the models were primarily demographic or disability related: family socioeconomic status (SES), gender, initial grade level, level of VI, being a Braille user, and presence of a cognitive disability. In addition to these control variables, a variable to indicate primary school attendance was created to determine if there was an interaction with parental role. All of these variables were time invariant, meaning that their values remained the same at each time point.

Family SES. SES of the family was evaluated with two variables: mother's highest level of education and an index of income (whether the student's family lives in poverty). Mother's highest level of education was centered around its mean prior to entry into the model.

Gender. An overview of the SEELS data from Wave I reported that girls performed more poorly on the Mathematics calculations test (Blackorby et al., 2004); therefore, gender was included in the analyses.

Initial Grade Level. The grade the student was in at Wave 1 was included in the model as a control variable. Controlling for initial grade was necessary as there was a wide range of grades for the students in the sample (i.e., first to ninth grade) and as achievement is closely related to grade level. This variable was centred around its mean before entering it into the model. This variable was used to create a dichotomous variable that indicated whether the student was in primary school (first to fifth grade) at the start of the study. This primary school indicator was used to test for an interaction with parental role, as previous research has indicated that the effects of parental role can differ based on grade level.

Level of VI. The schools did not identify the level of vision loss of students, but parents were asked to state whether their child's disability was complete blindness. This dichotomous variable was used to differentiate level of VI impairment of students in the sample (i.e., blind or visually impaired).

Braille User. Several variables were available in the teacher, parent, and assessment data that indicate whether the student uses Braille. It is important to realize that many students in primary school may use a combination of Braille and large print and that not all students who use Braille use it exclusively. Parents were directly asked if their child uses Braille, a variable in the direct assessment data indicated whether the student used Braille for the assessments, and teachers reported how frequently a student received Braille instruction. Responses to these variables were combined to create a variable identifying students as Braille users. This variable, in addition to the variable indicating Braille was used for the WJ-III tests, was tested in the models.

Cognitive Disability. Students with cognitive disabilities were expected to have lower Mathematics achievement; therefore, presence of a cognitive disability was included as a control variable in our analyses. A dichotomous cognitive disability variable was created based on data from two variables present in the database: teacher report of disabilities the student has and parent report of disabilities the student has if the teacher report was missing. Students in our sample were identified with a cognitive disability if they had mental retardation ($n = 9$), developmental delay ($n = 7$), autism ($n = 3$), or traumatic brain injury ($n = 1$).

10. Demographics of Sample

The PRS sample ($N = 215$) was used to report these demographic characteristics. The majority of the sample was male (59.4%). The ethnicity breakdown was as follows: 54.0% Tiv, 26.3% Idoma, 13.1% Iggede, 5.2% Hausa, and the remaining 1.4% Etulo. The majority of students (64.5%) were in primary school, and the remainder were in secondary school (34.9%) or post secondary (0.6%). Almost 31.2% of the students were Braille users, and 17.0% of the students' parents reported that their child was totally blind. Mother's level of education varied from less than secondary school (14.3%) to secondary school (30.9.0%), to post secondary (30.2%), to a bachelor's degree or higher (24.7%). Of the students' families, 24.3% lived in poverty. Approximately one third of the sample had one or more disabilities in addition to the VI. The most commonly reported disabilities were (a) health impairment (16.7%), (b) attention deficit disorder (14.4%), (c) physical or orthopaedic impairment (7.9%), and (d) learning disability (8.1%). A small percentage (7.2%) had a cognitive disability in addition to their VI.

11. Statistical Technique

The statistical technique used to analyze the data was multilevel modelling. Two primary advantages to this method are that it allows for an estimation of individual change trajectories as a function of person-specific parameters and random error and that it allows for the number and timing of observations to vary randomly across participants. In other words, with multilevel modelling the researcher can determine the average rate of change and individual variability in change over time and can utilize all observations in the estimation of parameters, even if they include only one time point.

The statistical models have two levels: (a) the Level 1 model, referred to as the individual growth model, represents the change in the outcome measure experienced by each respondent over time, and (b) the Level 2 model represents differences in changes in the outcome measure across respondents. SAS Version 9.2 (SAS Institute, Cary, NC), and specifically the PROC MIXED procedure with full maximum likelihood estimation, was used for the analyses. Prior to analyzing the data, the SEELS data set was converted from its current person-level format to a person-period format.

Two separate models were fit, one for each independent variable (PRS and PRH). The model-fitting method recommended by Singer and Willett (2003) was followed. The unconditional means model and the unconditional growth fixed and a random effect in both models. The independent variable and its interaction with time was entered into each model next, followed by the control variables. Interactions between parental role and primary school attendance and cognitive disability were entered into the models next. Variables representing fixed effects that were not significant at the $p = .05$ level were removed to obtain the final models, whereas random effects (variance components) were retained at the $p = .10$ level.

12. Results

12.1 Levels of Parental Role

Levels of PRS were low for most students, but there was a significant amount of variability. The average level of PRS across all time points was 4.05 ($SD = 2.98$), and the full range of 0 to 12 was reported. This level did vary by wave, with greater levels of PRS reported in the earlier waves, when students were younger. Means at each wave were 4.61 ($SD = 3.11$), 3.97 ($SD = 2.98$), and 3.64 ($SD = 2.78$).

Levels of PRH were high for most students. The average level of PRH across all time points was 9.38 ($SD = 1.81$), and the full range of 3 to 12 was reported. As with PRS, the level of PRH

varied by wave, with successively lower levels reported at each wave. Means at each wave were 10.05 ($SD = 1.70$), 9.36 ($SD = 1.74$), and 8.72 ($SD = 1.75$).

Although average levels of each variable were different (one at the high end of its scale and one at the low end of its scale), there was a correlation of .28 ($p < .01$) between the variables. This significant correlation indicates that the two parental role scores tended to vary together, but the relationship was only moderate in size. Therefore, some parents who reported a high level of involvement at home reported limited, or no, involvement at school, whereas some who reported a below average level of involvement at home reported a high level of involvement at school.

12.2 PRS

The unconditional means and growth models were examined first. Because these two models were almost identical for both the PRS and PRH models (the only difference being an additional 17 students in the PRS models), results for both are reported here. Results indicated that almost two thirds of the variation in math achievement was attributable to differences between students (PRS $p = .647$, PRH $p = .639$). Just less than half of the variation in math achievement was associated with time (49.4% for PRS and 46.0% for PRH).

Gender, being a Braille user, and level of VI were the only control variables that were not significant and were therefore dropped from both final models. PRS had a positive effect on Mathematics achievement over time, but only for those students who were attending primary school during Wave 1. The variables in the final model explained 56.5% of the variation in initial Mathematics achievement and 43.0% of the variation in growth of Mathematics achievement. The effect of PRS did not differ based on the presence of a cognitive disability. Three levels of PRS (*low* = 1, *average* = 4, and *high* = 9) are displayed. Note that all graphs assume the same level of parental role at each time point, although this variable was time variant and could change over time.

12.3 PRH

PRH significantly predicted Mathematics achievement. However, the direction of the relationship differed by the presence of a cognitive disability. The relationship was negative for students without a cognitive disability and positive for students with a cognitive disability. The effect did not differ based on grade attended at Wave 1. The variables in the final model explained 59.1% of the variation in initial Mathematics achievement and 26.9% of the variation in growth of Mathematics achievement. Three levels of PRH (*low* = 6, *average* = 9, and *high* = 12) are displayed for students with and without a cognitive disability. The interaction between cognitive disability and parental role is demonstrated by the reversal of the effect of low to high levels of PRH.

13. Discussion

A significant relationship between both PRS and PRH was documented in this study. An interesting finding was the differential effect of PRH based on the presence of a cognitive disability. Parental role in each area is discussed separately, as the results were in different directions.

13.1 PRS

As documented in research with the general population, a positive relationship between PRS and Mathematics achievement was found, but only for students who started the study in primary one through primary five. This relationship was significant over time, meaning that PRS had a positive effect on the growth of Mathematics achievement over time for children who started the study in primary school. Because this effect involved an interaction with time, the effect was strongest at

the last wave, when many of these students were in junior school. PRS did not have an effect on achievement for students who started the study in junior school and progressed to senior secondary school during the study. These findings indicate that PRS is important for students with VI while in late primary and junior school but not in secondary school. These results differ slightly from previous research in which PRS had a positive, but weaker, relationship with achievement for students in junior school than in primary school (Hill & Tyson, 2009).

PRS has been theorized to affect achievement by increasing motivation for school in students (Pomerantz, Moorman, & Litwack, 2007). This may be one of the reasons for the positive relationship exhibited here. For this population, there may also be an alternative explanation. Students with VI are usually educated in general education classrooms—unless they have significant additional disabilities—and are expected to keep up with the other students in their classes. This is possible *if* they are given the accommodations and supports they need. High levels of continued PRS may help students with VI get the appropriate accommodations and supports they need to function better and therefore perform better academically (Kelly, 2009). In some schools, it is possible that students will not receive the accommodations and supports they need without the advocacy of a parent. Perhaps it is for these students that PRS is most important, but this is not something we can assess with the available data. That the effect was seen in growth over time, not in initial scores, may be associated with the fact that at higher grades with increasing Mathematics complexity, the problems become more difficult to solve without accessible materials and appropriate supports.

13.2 PRH

A negative relationship between PRH and achievement has been found in some studies of the general population, particularly those focusing on homework help (Patall, Cooper & Robinson, 2008; Pomerantz, Moorman, & Litwack, 2007). Similarly, students without cognitive deficits in this study who received the most assistance from their parents were more likely to have lower Mathematics achievement. One explanation that has been suggested for this relationship is an achievement-involvement link: Those students who are doing poorly receive more help and attention at home as a reaction to their low achievement. This may explain the negative relationship exhibited in the present study.

There are also several possible explanations for this finding specific to students with VI. For the population in this study, the availability of accessible materials and appropriate supports is an issue. One potential explanation of the findings is that students may be having more difficulty in Mathematics because of a lack of accessible materials, which would require more assistance at home from parents to help them complete their homework and to “catch up” on the material covered daily in class. However, despite extra parental attention at home, lack of accessible materials would likely be associated with lower achievement scores. Unfortunately, students who require Braille or large-print textbooks and other school materials often do not receive them, receive them much later than the other students (Corn & Wall, 2002; Smith, Geruschat, & Huebner, 2004), or receive material of inferior quality (Herzberg & Stough, 2009). If the student with a VI cannot independently access his or her homework or Mathematics book, parents will be required to assist with homework. Those students without accessible materials could be expected both to perform more poorly and to require a significant amount of PRH, resulting in the negative association exhibited in this study.

An alternative explanation is that lack of accessible materials and the amount of help required may cause parents to become frustrated, resulting in interactions marked by negative affect. Parental role characterized by negative affect is thought to result in negative outcomes for the child (Pomerantz, Moorman, & Litwack, 2007). It is also possible that even if the student does have accessible materials, he or she is not doing well in school and the parents do not understand why. Rather than recognizing the difficulty the child is facing caused by the VI, the parent may think the

poor performance is solely associated with lack of effort or motivation. This scenario could result in the interactions between the parent and child being characterized by negative effect. It is also possible that assisting children with Mathematics homework is more difficult for most parents than providing assistance in other areas (Patall, Cooper & Robinson, 2008).

Another potential explanation should be considered for these findings: those students with VI who receive a great amount of assistance at home have more difficulty performing well independently at school. Overprotection of parents, including attempting to do too much for their children with VI, has long been a concern of professionals who work with this population (Bishop, 2000).

Given the number of plausible explanations for why PRH and achievement were negatively related for this population, why was there a strong *positive* relationship between these variables for students with cognitive impairments? Perhaps it is because students with both a VI and a cognitive disability are more likely to *require* some assistance and encouragement at home to succeed academically, regardless of accessibility of materials and supports. For students with two (and possibly more) significant disabilities including one that affects cognition, parents will likely expect that there is a need to be involved in their schoolwork at home and also may have realistic expectations as to their performance. This may result in a more pleasant experience, characterized by positive effect, for both the student and the parent when parents provide assistance and encouragement at home. Perhaps results for those students with combined vision and cognitive disabilities were more consistent with results for all students with a cognitive disability. However, because no research on this population is available, we cannot confirm or deny this.

13.3 Limitations

Although the longitudinal nature of the study is strength, the data are from naturally occurring situations and thus are essentially correlational. As has been suggested, it is possible that other factors (e.g. cognitive disability) may affect both parental role and achievement. Thus, our inferences as to the "effects" of parental role must be approached with caution and with attention to findings from previous research. A small number of students with a primary disability of VI and a cognitive disability were present in the data. Therefore, the results associated with cognitive disability should be interpreted with caution, and additional research in this area to confirm these findings is warranted.

14. Implications and Recommendations

Parents should strive for continued high levels of involvement at school as students with VI get older. The key finding of a positive association between PRS and Mathematics achievement for students who started in primary school showed the greatest effect in primary four through primary six. However, levels of PRS decreased with age.

Teachers and administrators should encourage more PRS for parents of students with VI. Study findings confirmed the importance of PRS for youth with VI (at least those who were in primary school at the beginning of the study), but levels of PRS tended to be low. Encouragement for participation from schools and teachers may make a difference.

Schools should ensure that they offer a number of opportunities and flexibility for organized parental role and should increase their advertisement and encouragement of these opportunities. Research supports the potential benefits of policies and programs aimed at increasing parental role (Hill & Taylor, 2004). All parents need to be informed about their opportunities to contribute, and some parents need to be encouraged that they have something to offer (Long, 2007). Providing flexible options for involvement is also important to allow more parents to participate.

Teachers of students with VI need enhanced training on (a) how to encourage involvement and (b) how to effectively involve parents. Teachers can play an important role in increasing

parental role in school and home but may not have the resources or knowledge of how to promote parental role (Hill & Taylor, 2004). Research supports the idea that parents want and will respond to information about assisting their children (e.g. Hill & Taylor, 2004).

Parents of students with a combined VI and cognitive disability should be provided with encouragement and support for assisting their children at home. The finding of a strong positive relationship between PRH and math achievement for these students provides support for this recommendation. Teachers of students with VI could provide this encouragement and support.

Students with VI who are low achieving in Mathematics may benefit from interventions designed to increased PRH. For students with a cognitive disability, more PRH was clearly beneficial. The negative relationship between PRH and math achievement (for students without a cognitive disability) does not mean that an intervention aimed at increasing PRH could not be beneficial for this population. This is supported by experimental studies of students in the general population documenting a positive relationship between parental role in homework and Mathematics achievement (Nye et al., 2006; Patall et al., 2008), despite the negative relationship documented in correlational studies and findings from a successful math intervention involving parents of students in special education (Minner, 1989). The results from this study indicate that parents may need assistance with *how* to provide help to their children with VI at home.

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